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north pole on the tangent plane at the south pole becomes the projection from the transformed south pole on the tangent plane at the north pole.

It must, however, be noted that while this rotation leaves the direction of the axis of x unchanged, that of y is reversed. Consequently, if we look at the new tangent plane from above, the axis of y is drawn so as to make an angle of $-90°$ with the axis of x. As seen from the centre of the sphere, however, both axes have their normal positions.

NOTES.

The double spiral was introduced by Holzmüller, Zeitschrift für Math. und Physik, Bd. 16. See also Theorie der Isogonalen Verwandtschaften by the same author.

The orthogonal substitutions have been treated by Cayley, Crelle, Bd. 32. Cf. Salmon's Higher Algebra, p. 41, and Scott's Determinants. Cayley gave a method of expressing the 9 constants of such a transformation rationally in terms of the three essential constants.

The theory of rotations was also treated by Rodrigues, Liouville's Journal, Vol. 5, and in connection with the linear transformations of a complex variable by Cayley, Math. Ann., Bd. XV. See also Klein, Ikosaeder, Chap. II.

The arrangement of much of the present article follows closely that of Klein's Lectures on the Theory of Functions, Leipzig, 1880–'81.

EXERCISE.

305

INTEGRATE $y\left(1+\dfrac{d^2y}{dx^2}\right)=x.$ [*R. S. Woodward.*]

PLATE II

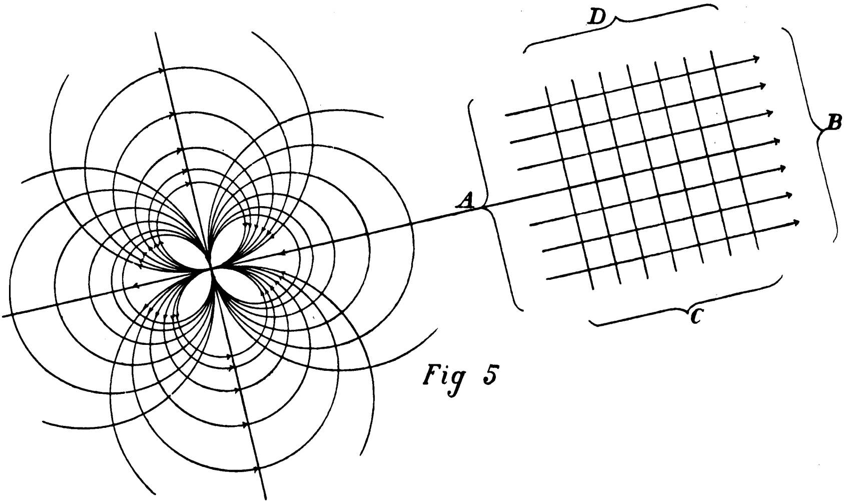

Fig 5

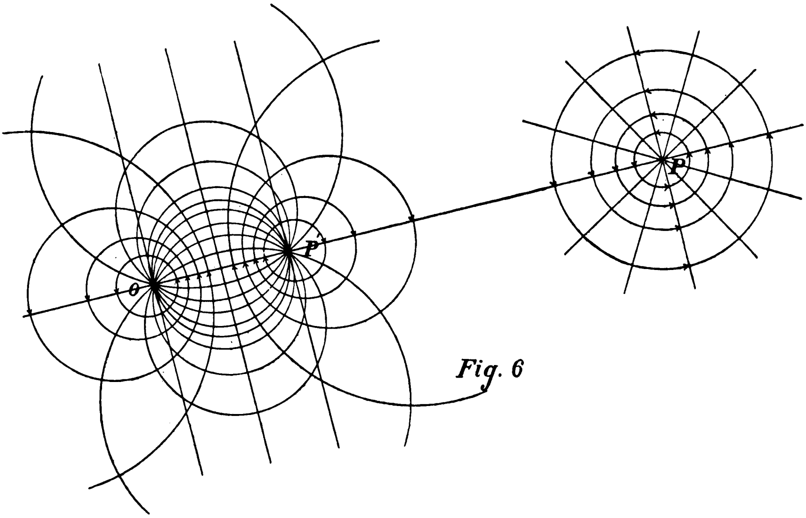

Fig. 6

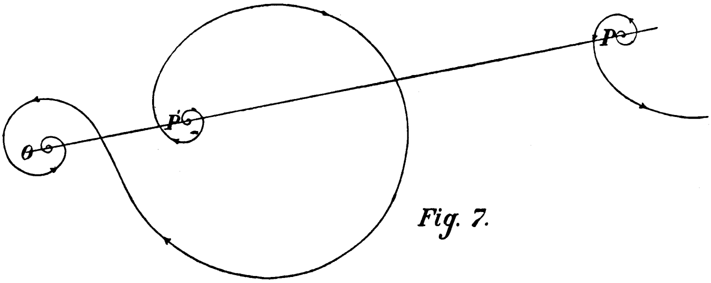

Fig. 7.

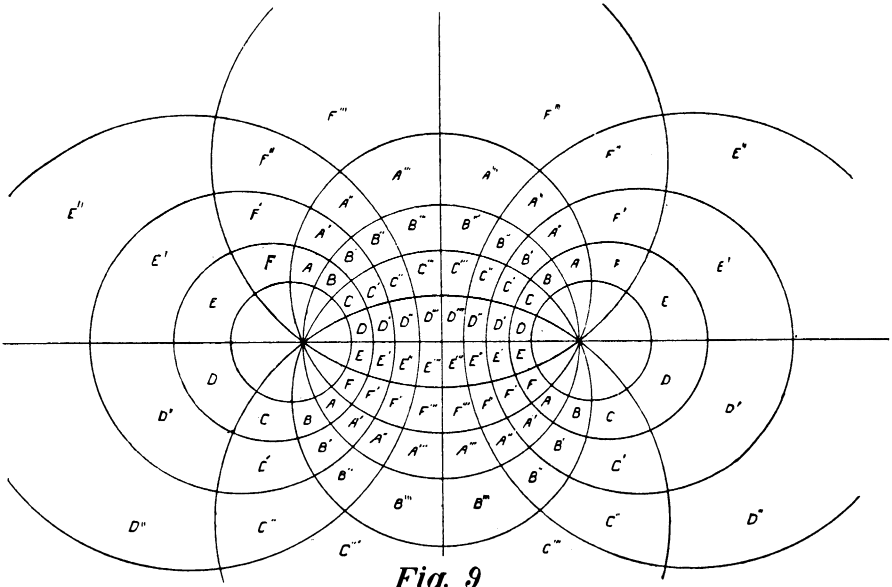
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Fig. 9

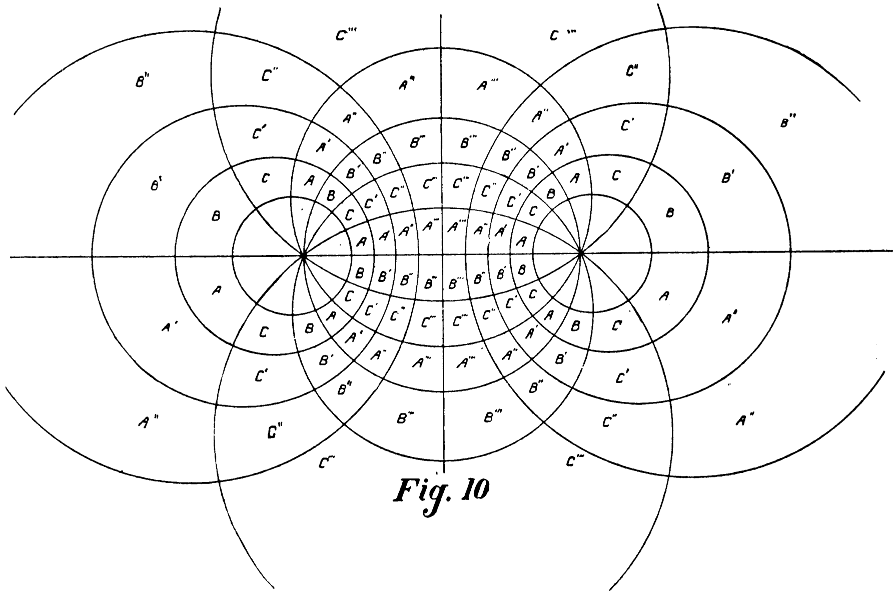
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Fig. 10

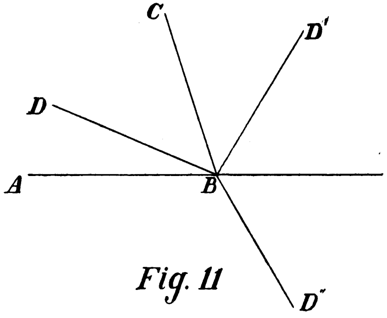

Fig. 11

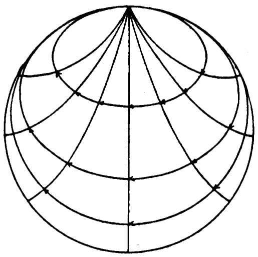

Fig. 12

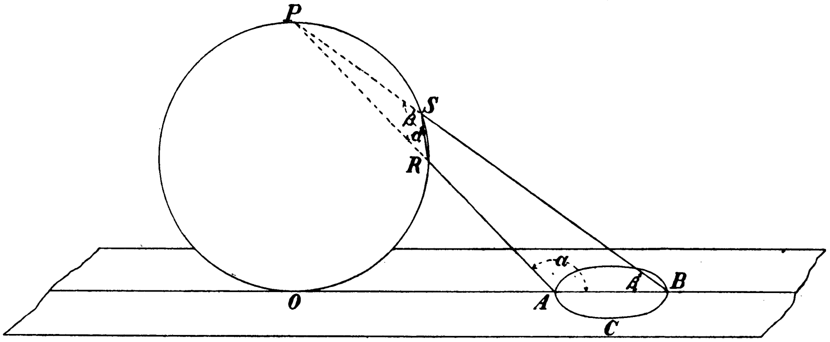

Fig. 13

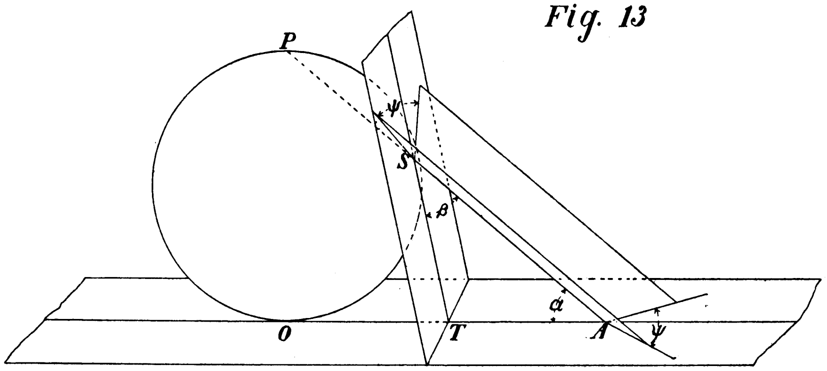

Fig. 14